

NASA Commercial Space Lecture Series

*Bringing the Civil, Commercial and Defense
Community Together to Solve Space
Sustainability*

3 November, 2021



Inc.



FAST COMPANY



Named to **Fast Company's** Annual List of the
World's Most Innovative Companies 2021, **ranked**
5th in the space category.



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“ Our **Mission** is to elevate our customers' abilities to monitor, simulate, and optimize their space systems with our dynamic virtual environments and decision intelligence technology.

Our **Vision** is to accelerate space sustainability to create a safer, more connected world.

Industry Overview

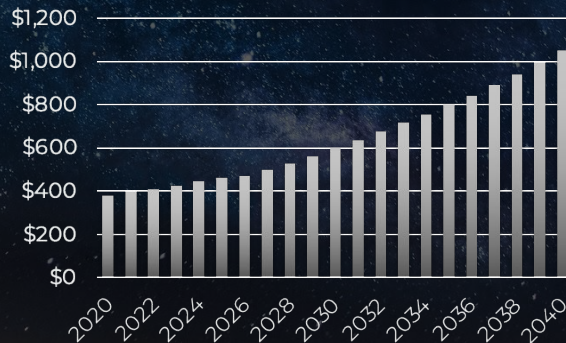
The Commercialization of the Space Domain

- **100,000** satellites scheduled for launch over the next 10 years
- **300+** launches scheduled for 2022
- Global space economy forecast to grow from \$350B to **\$1T by 2040**
- **\$8.9B** invested in the commercial space sector in 2020, up \$3B from 2019
- **800** Owner-Operators from 80+ around the world

Satellite Operators by Sector



Global space economy revenue forecast
(in billions USD)



The Militarization of the Space Domain



U.S. AIR FORCE



China / Military

Chinese satellite hints at space warfare prowess by dodging US surveillance

- Shijian 20, China's most advanced communication satellite, was approached by US surveillance satellite but reportedly moved away at speed
- Monitoring rivals' satellites is needed to avoid collisions, but the US is also concerned about Chinese satellites' potential warfare capabilities



Liu Zhen in Beijing
Published: 2:55pm, 2 Feb. 2021

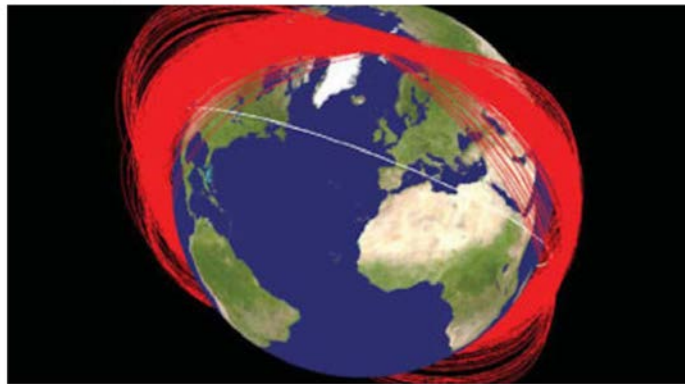


Shijian 20, China's most advanced communication satellite, was launched

SPACENEWS

Pentagon report: China amassing arsenal of anti-satellite weapons

by Sandra Erwin — September 1, 2020



Debris from the Chinese ASAT test in 2007. Credit: NASA

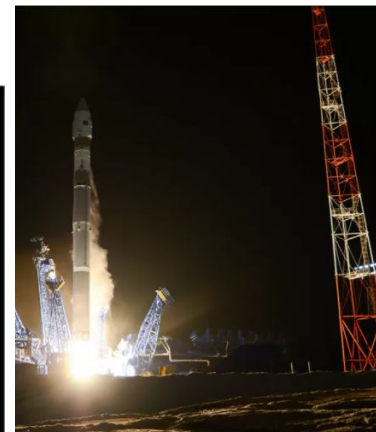
DoD report: China intends to pursue ASAT weapons despite its rhetoric against the militarization of space.

2 Russian satellites are stalking a US spysat in orbit. The Space Force is watching. (Report)

By Chelsea Gohd February 11, 2020

"We view this behavior as unusual and disturbing," Space Force

ments (5)



ed military satellite into orbit from the Plesetsk Cosmodrome
lite can apparently track other satellites in orbit and is
age credit: Roscosmos)

**Maintaining a sustainable space environment
requires**

***Establishing
Norms of
Behavior***

***Training the
NewSpace
Workforce***

Setting Norms of Behavior



The Need for Norms of Behavior



300%

Increase in
launches
compared to 2021



130M

Pieces of
debris



30X

Growth in
number
of satellites



RPO

Innovative
technologies
increase
unpredictability



More security
raising behavior
by
non-cooperatives



500K

Conjunction
alerts
everyday



Viewing windows
for research
are decreasing



Standard Setting Processes Today



SPACE NEWS

DoD calls for broader dialogue on space rules of behavior

by Sandra Erwin — July 26, 2021



SPACE NORMS AND U.S. NATIONAL SECURITY: LEADING ON SPACE DEBRIS

PHILIP POTTER, GEORGE W. FORESMAN, AND MICHAEL HOROWITZ

AUGUST 2, 2021



SPACE NEWS

U.S. to support international effort to set rules of behavior in space

by Sandra Erwin — February 24, 2021



UN Committee Votes 'Yes' On UK-US-Backed Space Rules Group

The delicate compromise between the US, Russia and China "may actually accomplish something," said Victoria Samson, head of Secure World Foundation's Washington office.

Maj. Gen. DeAnna Burr, commander of 6th Space Operations Command, Space Command

by THERESA HITCHENS on November 10, 2021 at 10 PM



A Different Strategy: Collaborative Tool-Based Standard Setting





*Ingest > Analyze > Filter
> Prioritize > Connect >
Collaborate > Resolve*

Training the NewSpace Workforce

The Need for Training



11%

**Growth in the
Space Economy**



17%

**Growth in STEM
occupations**



12%

**Decrease in
interest in STEM**



46 yr

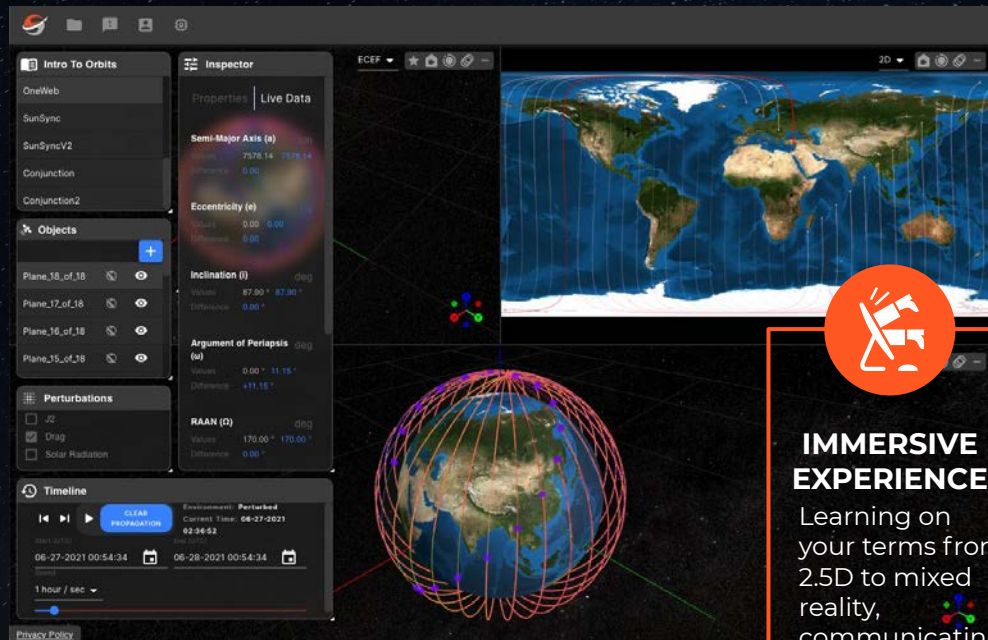
**Average age of
the space
workforce**



3%

**of Engineering
Degrees are
Astrodynamics
Degrees**

Slingshot Laboratory: Closing the Astro Gap



**Teach Space by
Doing Space.**



IMMERSIVE EXPERIENCE

Learning on your terms from 2.5D to mixed reality, communicating key concepts quickly and easily



ANYWHERE ACCESS

Leveraging AWS, Laboratory is web accessible on any device, giving you the flexibility to learn from anywhere



REAL-TIME COLLAB

Real-time sharing and collaborating allows for easier and faster problem solving and deeper learning



EASY TO USE

Laboratory's simple UI allows beginners and advanced users to quickly start harnessing the real physics engine

The Role of Government in the New Space Era

SPACEWERX



THE **CATALYST**
ACCELERATOR
AT CATALYST CAMPUS FOR TECHNOLOGY AND INNOVATION



techstars®



STARBURST



SPACE ACCELERATOR

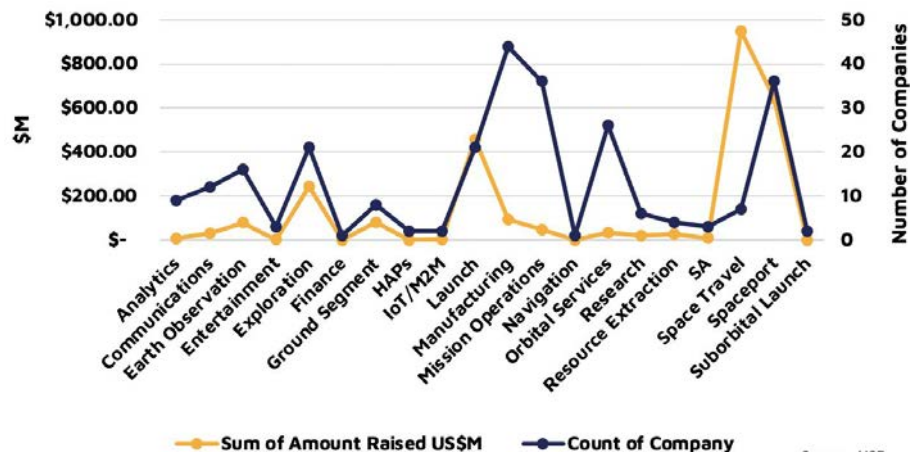
SPACE FORCE
PITCH DAY

HYPERSPACE CHALLENGE



AIR FORCE PITCH DAY

Government Funding in NewSpace



Source: NSR

Government Funding in New Space as of June 2021

Thank you!

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